

REMARKS

This Response is submitted in reply to the Final Office Action dated August 6, 2007, in which the Examiner:

rejected claims 1-5 under 35 USC § 103(a) as being unpatentable over US Patent No. 6,352,662 to Murphy et al. (Murphy) in view of US Patent No. 6,299,810 to Blackinton, Jr. et al. (Blackinton).

The rejection is respectfully traversed as follows. Claims 1-5 are pending, of which Claim 1 is the only independent claim.

To establish a *prima facie* case of obviousness, all the claim recitations must be taught or suggested by the state of the art. M.P.E.P. § 2143.03. Applicants respectfully submit that the Examiner has not established the *prima facie* case of obviousness because one of ordinary skill would not have combined Murphy with Blackinton to teach or suggest each recitation of Claim 1. Claim 1, which is directed to a method for forming a hollow fiber reinforced plastic (FRP) article by internal pressure molding, recites, in part, evacuating a vacuum chamber in an isolation state where a composite body and a forming die do not contact each other.

Applicants respectfully disagree with the Examiner that Murphy discloses placing a wrapped assembly in a mold without contacting or without substantially contacting the forming die. (Office Action, P. 2). Applicants respectfully disagree with the Examiner that Blackinton provides for molding a fiber reinforced article. (Office Action, P. 3 and P. 6). Applicants respectfully disagree with the Examiner that Blackinton teaches a person of ordinary skill in the art to provide floating and keeping the bag off the weave. (Office Action, P. 5-6). Finally, Applicants respectfully disagree with the Examiner that it would have been obvious for one of ordinary skill in the art to provide the vacuum bag and chamber of Blackinton in the process of Murphy to allow for the removal of air bubbles from within the pre-preg.

Murphy does not show or disclose each recitation of Claim 1. Murphy discloses wrapping a mandrel with a bladder and a plurality of pre-preg plies, placing the wrapped assembly within, and into contact with, a mold and pressing the pre-preg plies outward against the mold by introducing a pressurized gas through the mandrel. (Murphy, col. 3, ll. 5-25; col. 5, ll. 32-35; FIG. 3). Compare the left end of the pre-preg and lock support in Murphy (FIG. 3) with the cantilevered support of the left end of the pre-preg in Applicant's FIG. 3. "The mold generally will include a cavity having a predefined shape for the shaft and grip region..." (Murphy, col. 3, ll. 8-11). Murphy fails to disclose applying a vacuum. Murphy also fails to disclose a vacuum chamber. As indicated above and in contrast to Examiner's allegation, Murphy does disclose in FIG. 3 that the pre-preg plies contact the mold when the wrapped assembly is placed inside the mold. Most importantly, Murphy does not support the pre-preg out of contact with the mold during evacuation to allow removal of air bubbles from the pre-preg. Contrast the lack of mandrel support in Murphy FIG. 3 with Applicant's FIG. 3.

Blackinton discloses a process for vacuum compression of a carbon fiber weave or sample to form a solid plank or board. In one embodiment a carbon fiber weave is wound about a mandrel, and the weave and mandrel are placed within a vacuum bag. (Blackinton, Abstract; col. 4, lines 40-41; col. 19, lines 6-14.) "The vacuum bag 400 typically is formed from a plastic bag material such as nylon or polyethylene..." (Blackinton, col. 19, ll. 14-18). The mandrel is sealed within the vacuum bag and placed within a vacuum chamber, wherein a vacuum is drawn both on the vacuum chamber and the vacuum bag causing the vacuum bag "to float above the carbon weave or sample so that as air is drawn from the weave, the bag is kept off the weave." (Blackinton, col. 4, lines 51-54; col. 19, lines 26-34.) The vacuum in the chamber is then reduced "so that there is a pressure differential between the chamber and the bag, causing the bag to compress tightly about the carbon fiber weave so as to apply a pressure thereto." (Blackinton, col. 4, lines 61-65; col. 19, lines 41-49). FIG. 8B illustrates a tray in the vacuum chamber to support the mandrel sealed within a vacuum bag. (Blackinton, FIG. 8B). Thus, the vacuum bag 400 necessarily contacts the weave

15 at the tray/bag interface, again in contrast to the pre-preg shown in Applicants' cantilevered support of FIG. 3. Hence, neither Murphy nor Blackinton teaches a support that keeps the forming die out of contact with the pre-preg during evacuation, as defined in Claim 1.

Applicants respectfully submit that one of ordinary skill in the art would not have been motivated to replace the mold of Murphy, having a predefined cavity and shape, with the plastic vacuum bag of Blackinton, having no predefined cavity or shape. Further, the mandrel in FIGS. 8A-8B of Blackinton provides for the shaping and molding function, while the bag merely provides compression function. In contrast, the bladder of Murphy provides the compression function, while the mold provides the shaping and molding function. Therefore, Blackinton does not teach or suggest molding a fiber reinforced article with a bag but merely teaches compressing a weave with a bag. One of ordinary skill would not have been motivated to replace the mold of Murphy, having a predefined cavity and shape for a molding function, with the bag of Blackinton, having no predefined cavity or shape and a compression function.

Moreover, with reference to the disclosure of col. 10 of Blackinton, Applicants respectfully disagree with the Examiner that there is evidence of the interchangeability of the bag of Blackinton for the mold of Murphy. While an upper mold plate 86 and a tray 73 may be formed with varying topographies in the embodiment of col. 10 of Blackinton, the Examiner himself believes the vacuum bag to be "deformable" as stated at page 6 of the Office Action. The vacuum bag of Blackinton cannot have the varying topography intended for the mold plate 86 of Blackinton, or the cavity and defining shape intended for the mold of Murphy. Therefore, there was no motivation to replace the mold of Murphy with the bag of Blackinton in light of the embodiment of col. 10 of Blackinton.

Furthermore, Applicants respectfully submit that FIG. 8B refutes the assertion that Blackinton provides for floating and keeping the bag off the weave

because the vacuum bag 400 necessarily contacts the weave 15 at the tray / bag interface. In fact, the Examiner has acknowledged that "...Blackinton does appear to provide something under the bag in Fig. 8B". (Office Action, P. 6). Furthermore, "[t]he mandrel sealed within its vacuum bag is then placed within the vacuum chamber 407 (FIG. 8B)..." (Blackinton, col. 19, ll. 26-27). Thus, the vacuum chamber 407 includes the tray, as illustrated in FIGS. 8A-8B.

Moreover, Applicants respectfully note that all of the vacuum chambers of Blackinton include a tray (73, 120, 300) for contacting and/or supporting the weave in contact with a surface before a vacuum is applied. (Blackinton, col. 9, ll. 13-20, FIGS. 1 and 3A; col. 12, ll. 13-18, col. 14, ll. 65-67- col. 15, ll. 1-4, FIGS. 4-5C; col. 15, ll. 56-60, col. 16, ll. 18-22, FIGS. 6A-7B). Therefore, in addition to the express disclosure of the vacuum chamber 407 in FIG. 8B including a tray, the disclosure of Blackinton, read as a whole, provides for vacuum chambers with a tray, which destroy the teaching of providing floating and keeping the bag off the weave.

Furthermore, Applicants respectfully submit that it would not have been obvious to provide the vacuum bag 400 and the vacuum chamber 407 of Blackinton in the process of Murphy. Such a combination would provide for an invention inferior to the invention defined in Claim 1, and therefore, would not have provided a reasonable expectation of success. For instance, providing the vacuum bag 400 in between the wrapped assembly and the mold of Murphy would interfere with the mold under vacuum by: (1) interfering with the curing process as the mold is heated; and (2) causing imperfections or wrinkles from the weave as the pressure is changed in the vacuum to compress the sample within the vacuum bag. Therefore, it would not have been obvious to provide the vacuum bag 400 and the vacuum chamber 407 of Blackinton in the process of Murphy.

Furthermore, Applicants note that the goal of Murphy is to provide for a shaped sample by including, for example, a mold with a cavity having a predefined shape for a shaft and a grip region. (Murphy, col. 3, ll. 9-14).

However, even if the mold of Murphy were replaced with the vacuum bag of Blackinton, all that would result is a compressed sample, and not a shaped sample, because the vacuum bag is deformable and does not have cavities or a predetermined shape to mold the sample. Therefore, there was no motivation to combine Murphy and Blackinton as suggested by the Examiner because such a combination would not have yielded a shaped sample as required by Murphy.

Finally, Applicants respectfully submit that the references teach away from combination. For instance, a substantial redesign of Murphy would be required for the combination (i.e., there would need to be internal heating elements and deletion of the bladder), which would change the internal pressure molding process of Murphy. Thus, the references themselves teach away from combination.

As one of ordinary skill would not have combined Murphy with Blackinton, Applicants respectfully request the allowance of Claim 1 for at least the reasons stated above. Furthermore, Claims 2-5 depend from Claim 1 and include additional recitations. Applicants respectfully request allowance of Claims 2-5 for at least the reasons states in connection with Claim 1.

Applicants believe that no fees are due in connection with filing this Response. However authorization is hereby given to charge Deposit Account No. 13-0235 in the event any such fees are owed.

Respectfully submitted,

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